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Psychiatric Aspect and Treatment Considerations in Parkinson's Disease

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ABSTRACT

Persons with the diagnosis of Parkinson's disease (PD) are a high risk group for different psychiatric problems such as anxiety, depression, anxiety related disorder, psychosis, aggression, stress etc. The present study was mainly aimed at understanding the comorbid psychiatric conditions and the factors significantly influencing the treatment of Parkinson's disease. For this, 100 patients of PD aged 45 to 70 years were selected from the patients who were attending the OPD of neurology departments at PGIMS, Rohtak, PGIMER, Chandigarh, and Ram Manohar Lohiya Hospital, to participate in the study along with 100 normal controls. Data were collected by administering Personality Assessment Inventory by Morey, 1999. Data were analyzed by descriptive statistics (Mean, SD, SK, and KU) to ascertain the normalcy of data, t-ratios to compare the two groups in terms of their mean scores of eleven clinical scales and five treatment consideration scales and Discriminant Function Analysis to examine the joint contribution of all the sixteen variables in differentiation of two groups. Results revealed that patients with PD scored significantly high on nine clinical scales out of eleven scale and high on all treatment consideration scales. In Discriminant Analysis, Depression, Stress, Non-Support, Anxiety, Aggression, Paranoia, Anxiety Related Disorders, Treatment Rejection and Anti-Social Features emerged most potent discriminators classifying the two groups correctly by 99.5%. Overall findings revealed the patients with Parkinson's disease tend to develop the neurotic and psychotic spectrum disorders along with the attitudinal and behavioural tendencies which can reduce the treatment compliance among them.

***Key words*:** Psychiatric Problems, Treatment Compliance, Parkinson's disease

Parkinson's disease (PD) is a common progressive neurodegenerative disorder in which dopamine (DA) deficiency arises as a consequence of degeneration in the substantia nigra. The clinical diagnosis of PD rests on the identification of motor symptoms such as bradykinesia, tremor, rigidity and loss of postural reflexes (Langston, 2006). Recent neuropathological studies, however, have revealed that neuronal loss occurs beyond the dopaminergic system, and consequently patients display non-motor symptoms (NMS) (Wolters, 2008, Rogers *et al.*, 2004 and Nutt and Woolen, 2005) such as Neuropsychiatric symptoms (depression, apathy, anxiety, anhedonia, deficits in attention, hallucinations, dementia, obsessional behaviour, confusion, panic attacks);

For many years, PD was simply considered a neurological disease. However, following the advancement of research and clinical observations, it has more recently been classified as a neuropsychiatric disorder (Martin and Duda, 2006). The term psychiatric describes the mixture of both neurological and psychological symptoms. This newer classification properly acknowledges the mental health aspects of PD, in addition to the well recognized motor symptoms. Whether an individual develops a chronic degenerative disease like PD, he or she not only must face a myriad of physical changes, but must also confront significant psychological and social changes. These changes are often subtle and difficult for the patient to express to his or her physician. Researchers have shown that these psychosocial changes may significantly increase disability and interfere with acceptance and adjustment to the disease (Cote, 1999). Observations have led scholars to conclude that more attention must be directed towards certain psychopathological factors because their neglect can interfere even with the best medical treatment programmes (Hyman, 1972). Following the advancement of research and clinical evaluations, a multitude of psychiatric symptoms have been empirically observed in PD patients, including mood changes, anxiety disorders, hallucinations, psychoses, delusions, dementia and other cognitive dysfunctions. Management of these behavioral problems can greatly improve patients' overall functions and reduce the burden placed on caregivers. Specific cognitive deficits have been described in early PD, and at least, a 'third' of PD patients develops dementia (Anderson, 2004). The present study is a comprehensive effort to understand the psychopathology in PD patients.

Most of the earlier studies investigating psychopathology in PD have focused on single psychiatric diagnosis or condition. As a result, there have been gaps in knowledge pertaining to the relationship among psychopathological illnesses prior and post to the onset of PD. Treatment of Parkinson's disease comorbid with psychiatric disorders is a challenge because the specific aspects of both conditions have to be carefully managed for optimal treatment results. For this, comprehensive understanding of Comorbidity of various psychopathological conditions have been rarely studied with multivariate methodology. The present study is an empirical attempt to understand the comorbid psychiatric conditions and the factors significantly influencing the treatment compliance among the patients of Parkinson's disease. Another merit of the present study is that it attempts to investigate the psychopathological discriminators which jointly contribute in the discrimination of PD patients from the normal subjects by using Discriminant Function Analysis.

METHOD

Sample

The sample used in the present study consisted of two groups of subjects i.e. Clinical group (Parkinson's disease patients, N=100) and normal controls (N=100). The PD patients were selected from the patients who were attending the OPD of neurology departments at Post-graduate Institute of Medical Sciences (PGIMS), Rohtak, Post-graduate Institute of Medical Education and Research (PGIMER) Chandigarh, and Ram Manohar Lohiya Hospital, Delhi. The PD patients range in age from 45 to 70 years with the mean age of 57.5 years. The duration of illness in the PD patients included range from 5 to 15 years with the mean duration of 10 years. The sample consisted of both the males and females. Most of the patients were on L-dopa treatment. About 15 of the patients were on Sinemet treatment. All the patients married and were living in home setting with their family members.

A normal control group consisting of 100 subjects matched for age was drawn from the general population residents of various colonies of Rohtak and Kurukshetra cities. The normal subjects were found to be free from the serious psychopathological and medical problems, which can confound the results.

Measure/Test:

The participants of the study were tested with Personality Assessment Inventory (PAI, Morey, 1999). PAI is a self administered objectively scorable inventory designed to provide information on critical clinical variables. PAI originally consists of 344 items comprising 22 non-overlapping full scales: 4 validity scales, 11 clinical scales, 5 treatment consideration scales, and 2 interpersonal scales. The validity scales are Inconsistency (INC), Infrequency (INF), Negative Impression (NIM), and Positive Impression (PIM). Clinical Scales consists of Somatic Complaints(SOM), Anxiety(ANX), Anxiety Related Disorder(ARD), Depression(DEP), Mania(MAN), Paranoia(PAR), Schizophrenia(SCZ), Borderline Feature(BOR), Antisocial Feature(ANT), Alcohol Problem(ALC), and Drug Problems (DRG), and Treatment Consideration scales include Aggression (AGG), Suicide Ideation (SUI), Stress (STR), Non-Support (NON), and Treatment Rejection (RXR). Interpersonal scales consist of Dominance (DOM) and warmth (WAR). In the present study PAI was scored for only 11 clinical scales and 5 treatment consideration scales. The variables of PAI have reported to be satisfactory across various clinical samples.

Results:

Obtained data were analyzed using the SPSS 11.5 for descriptive statistics (Mean, SD, SK and KU) ascertain the normality of data, t-ratio to compare the two groups (Parkinsons disease and Normal matched) in terms of significance of differences in mean scores of 16 variables (Table-1). Discriminant Function Analysis was used to examine the joint contribution of all the sixteen variables in differentiation of two groups (Table-2).

Table-1 Comparison of two groups (Parkinson's and Normal groups, N each=100) with their Mean score,SD,SK and KU.

Clinical scales										
Var	Clinical Group				Normal Group				t-value	Sig/ NS
	Mean	SD	SK	KU	Mean	SD	SK	KU		
SOM	2.24	.96	.43	-.09	1.46	1.10	.52	-.21	5.46	P<.01
ANX	4.16	1.81	.16	-.94	1.46	1.15	.54	-.23	12.62	P<.01
ARD	4.93	2.10	.14	-1.10	1.90	1.37	.52	-.16	12.11	P<.01
DEP	5.45	1.69	.12	-.99	1.04	1.05	1.14	1.55	22.13	P<.01
MAN	2.71	1.34	.52	.05	2.67	1.69	.78	.51	0.14	Ns
PAR	5.92	2.58	.23	-.33	1.92	1.68	.72	-.01	12.98	P<.01
SCZ	1.70	.67	.65	,23	1.26	1.04	.50	-.45	3.54	P<.01
BOR	9.86	2.40	9.16	8.78	10.4	1.60	.34	-.85	7.04	P<.01
ANT	1.74	.74	.36	-.26	1.18	1.11	.80	.09	4.55	P<.01
ALC	.17	.36	1.88	1.56	.18	.47	.73	-1.49	0.16	Ns
DRG	1.94	1.82	.36	-1.28	.97	1.38	.76	-1.40	5.27	P<.01
Treatment Consideration scales										
AGG	3.29	1.68	.48	-.65	1.25	1.06	.70	.03	10.16	P<.01
SUI	1.72	1.30	.36	-.16	.74	.82	.96	.36	6.28	P<.01
NON	1.83	.98	-.33	.36	.53	.90	1.25	-.15	9.85	P<.01
RXR	1.83	1.18	.45	.40	.66	.92	.81	-1.14	7.80	P<.01
STR	5.93	2.36	-.05	-.72	1.78	1.14	.19	-.66	15.96	P<.01

Table 1 reveals that Parkinson's patients have obtained significantly high scores on nine of the eleven scales of psychopathology viz. Somatic Complains, Anxiety, Anxiety Related Disorder, Depression, Paranoia, Schizophrenia, Borderline Features, Anti social Features, and Drug problem than normal controls depicting that Parkinson's patients tend to develop both the neurotic and psychotic spectrum disorders after being diagnosed. Measures of anxiety, anxiety related disorders and depression represents neurotic spectrum, whereas measures of paranoia, schizophrenia, borderline features and anti social features represents the psychotic spectrum (Morey, 1999). No significant difference in the mean scores of mania and alcohol problems are well understandable in terms of the nature of PD and its effect on behavioural manifestations. The present findings are very much confirmatory to the earlier findings which have reported high rate of comorbid psychopathological problems among PD patients than in general population.

In case of treatment consideration scales, PD patients have scored significantly high on all the five scales viz. Aggression, Suicidal Ideation, Stress, Non-Support, and Treatment Rejection than their counterparts normal controls. It posits that PD patients tend to develop high level of aggression tendencies, suicidal ideation, and feeling of non-support from family and acquaintances, and stress; and low level of treat motivation to get the treatment with the assumption that illness is not treatable.

Discriminant Analysis (Parkinson's Patients VS Normal Controls)

Although the comparison of mean scores of two groups on eleven scales of psychopathology and five of treatment consideration provided the differential profile of PD patients and normal controls, yet to examine the extent to which 16 variables jointly differentiated successfully between the two groups, Discriminant Function Analysis (Tabachnick And Fiddle, 1989) was applied. By identifying the significance of selected variables in linear combination, this analysis permits (1) the understanding of synergistic role of identified discriminators in the separation of the two groups (Parkinson's vs Normals), and (2) their classification accuracy, which is an additional indicator of the effectiveness of the discriminant function.

Stepwise Discriminant Analysis with respect to patients with Parkinson's male vs Normal male Group(N=100 each group)

Variables	F-to-remove	Wilk's Lamda	Wilk'sLamda decrement	Standardised Discreminant Function Coeffecient
DEP	107.41	.174	.288	.652
STR	17.94	.122	.199	.327
NON	26.51	.126	.170	.375
ANX	16.53	.121	.150	.305
AGG	14.98	.120	.136	.293
PAR	21.22	.124	.125	.353
ARD	13.92	.120	.118	.286
RXR	6.58	.115	.114	.199
ANT	5.28	.114	.111	.182

Canonical Discriminant Functions

Function	Eigen-value	%variance	Cumulative %variance	Canonical Correlation
1	1.983	100	100	.943
Test of function	Wilk's Lamda	Chi-square	Df	Significant
1	.111	424.79	9	.000

Classification Summary

	Predicted group membership		
Original group	Group 1	Group 2	Total
1	99	1	100
2	0	100	100
Count %			
1	99	1	100
2	0	100	100

99.5% of original cases correctly classified

Table 2 provides a summary of the outcome of stepwise discriminant analysis. As can be noted, out of 16 potential discriminating variables, a set of only nine discriminators viz Depression, Stress, Non-Support, Anxiety, Aggression, Paranoia, Anxiety Related Disorders, Treatment Rejection and Anti-Social Features formed the discriminant equation/function. These nine variables in combination contributed maximally in discriminating patients with PD from their normal counterparts (Eigen value=1.983). This also shows that Sometic Complaints, Mania, Schizophrenia, Borderline features and Suicide did not comprise the discriminant function. Based on F-to-Remove values, the selected set of nine discriminators was arranged in the rank order of their relative importance for discrimination/separation between groups of PD patients and their control counterparts. As is clear from Table-2, Depression with largest F to remove value, made the highest contribution to the overall discrimination above and beyond the contribution made by other selected variables. The values of Wilk's Lamda corroborated the observed group differences over the same set of nine variables. Since Depression increased maximum within-group cohesiveness, this variable is found more than followed by other variables in that order. The values of Wilk's Lamda decrement further confirmed the relative unique contribution of each variable to the discriminant equation above and beyond the contributions of proceeding variables. While developing the descriminant function equations, Standardized Discriminant Function Equations (SDFE) were created. The magnitude of these coefficients regardless of signs also depicts the relative and unique contribution of each variable to the discriminant function (Table 2). The SDFC provided additional information to the conclusions derived on basis of the F-to-Remove and Wilk's Lambda/decrement values. SDFC values also documented that Depression contributed highest to the discrimination/separation of the patients with parkinsons and their counterpart normal controls. The direction of significant differences in respect of these discriminators was generally consistent with the signs of SDFC loadings.

In discriminant function analysis another important question is the accuracy of classification based on identified set of discriminators. Klecka (1985) suggested that classification accuracy can be used along with F-to-Remove, Lamda, and SDFCs to indicate the amount of discrimination contained in selected variables. However, he pointed out that if chance of accuracy is 50% (two groups of equal size), the classification accuracy should be at least 62.5% (25% greater than that is achieve by chance). Based on discriminant function (Depression, Stress, Non-Support, Anxiety, Aggression, Paranoia, Anxiety Related Disorders, treatment rejection and Anti-Social Features), the correct classification rate for Parkinson's patients is 99%. The corresponding classification accuracy for normal controls group is 100%. Thus, in Parkinson's group 1 of 100 cases (1%) were misclassified, whereas in respect of normal groups, no cases were incorrectly classified. The overall classification accuracy of known cases emerged to be 199 out of 200 (99.5%), a percentage higher than 62.5%. It provides an additional confirmation of the degree of group discrimination/separation i.e. between PD patients and normal group. Thus, Depression, Stress, Non-Support, Anxiety, Aggression, Paranoia, Anxiety Related

Disorders, Treatment Rejection and Anti-Social Features are hallmark symptoms of PD patients which discriminate them from normal individuals.

Discussion:

The findings of the present study characterizing the patients with PD document them to be significantly high on various psychiatric symptoms than their counterpart normal controls. PD patients have scored significantly high on somatic complaints, anxiety, anxiety-related disorders and depression than the normal subjects. It depicts that PD patients tend to develop chronic somatic complaints affecting most of the organ and systems accompanied by fatigue and weakness, irrational fears, worries, all obsessive thoughts, and depression at all the three levels i.e. cognitive, affective, and psychological. The symptoms of generalized anxiety disorder are excessive worry and anxiety in association with the somatic symptoms of restlessness, poor concentration, sleep disturbance, fatigue, irritability, and muscle tension. Anxiety is often a dominant symptom of the adjustment disorder which most patients go through when first diagnosed with Parkinson's (Hanagasi & Emre, 2005 and Menza, et al., 1993). Parkinson's patients show delusional expresses, social detachment and thought disturbance. Antisocial Feature depicting that Parkinson's patients tend to develop unstable and fluctuating interpersonal relations, impulsivity, and uncontrolled anger. Parkinson's patients have been found scored significantly high on namely aggression, suicidal ideation, non-support, stress and treatment rejection than their counterpart normal subjects. It hereby depicts that parkinsons tend to have attitudinal and behavioral features reflecting aggression, anger and hostility. Aggression is a behavioral problem that is frequently attributed (rightly or wrongly) to Parkinson's. Such individuals are easily provoked and may show explosive anger when frustrated. They tend to currently experience or have recently experience the life stressors. They perceive themselves as surrounded by crisis in nearly all major life areas. Sometimes the events that patients encounter in their lives lead to demoralization, a state of helplessness, hopelessness, confusion, and subjective incompetence (Nilsson, 2004). They also tend to perceive lack of social support as a result they tend to be highly critical of themselves as well as other people whom they perceive as caring and rejecting. Significantly high score on treatment rejection hereby depicts that Parkinson's patients more tend to develop treatment non-compliance if the treatment strategy is not perceived to be effective. Conclusively it denotes that patients with Parkinson's tend to develop the neurotic and psychotic spectrum disorders along with the attitudinal and behavioural tendencies which can reduce the treatment compliance among them.

Implications:

These results provide information about patients with Parkinson's that may be useful in their mental health. Awareness of, and early identification of, emotional disorders will hopefully enable quick referral to agencies trained to deal with problems of psychological adjustment. The main implication of the present findings lie in the fact that above mentioned psychopathological and behavioural variables on which PD

have scored significantly high, must be taken into account in both the diagnosis and treatment of PD. Hence, the present study is suggestive for eclectic approach (collaboration of medical and psychosocial treatment) to be used in both the diagnosis and treatment. For more generalizable results it is suggested to carry out the similar studies on large samples.

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